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(ii) Class III brake test.
(iii) Whenever the ECP brake system is powered on.

(2) Initialization shall, at a minimum:

(i) initialize the ECP brake system pursuant to AAR Series Standard S-4200; and

(ii) be performed in the sequential order of the vehicles in the train.

(3) Whenever an ECP brake system is initialized pursuant to this paragraph, the train crew must ensure that the total number of cars indicated by the ECP brake system is the same as the total number of cars indicated on the train consist.

(f) *Modifications to existing brake inspections.* (1) In lieu of the specific brake pipe service reductions and increases required in this part, an electronic signal that provides an equivalent application and release of the brakes shall be utilized when conducting any required inspection or test on a freight car or freight train equipped with an ECP brake system and operating in ECP brake mode.

(2) In lieu of the specific piston travel ranges contained in this part, the piston travel on freight cars equipped with ECP brake systems shall be within the piston travel limits stenciled or marked on the car or badge plate consistent with the manufacturers recommended limits, if so stenciled or marked.

(g) *ECP brake system train line cable.* Each ECP brake system train line cable shall:

(1) Be located and guarded to provide sufficient vertical clearance;

(2) Not cause any tripping hazards;

(3) Not hang with one end free whenever the equipment is used in a train movement;

(4) Not be positioned to interfere with the use of any safety appliance; or

(5) Not have any of the following conditions:

(i) Badly chafed or broken insulation.

(ii) Broken plugs, receptacles or terminals.

(iii) Broken or protruding strands of wire.

(h) *Exceptions.* A freight car or a freight train shall be exempt from the requirements contained in §§ 232.205(a) and (b), 232.207, 232.209, and 232.211(a)

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when it is equipped with an ECP brake system and operating in ECP brake mode.

§ 232.609 Handling of defective equipment with ECP brake systems.

(a) Ninety-five percent of the cars in a train operating in ECP brake mode shall have effective and operative brakes prior to use or departure from the train's initial terminal or any location where a Class I brake test is required to be performed on the entire train by a qualified mechanical inspector pursuant to § 232.607.

(b) A freight car equipped with an ECP brake system that is known to have arrived with ineffective or inoperative brakes at initial terminal of the next train which the car is to be included or at a location where a Class I brake test is required under §§ 232.607(b)(1) through (b)(3) shall not depart that location with ineffective or inoperative brakes in a train operating in ECP brake mode unless:

(1) The location does not have the ability to conduct the necessary repairs;

(2) The car is hauled only for the purpose of repair to the nearest forward location where the necessary repairs can be performed consistent with the guidance contained in § 232.15(f);

(3) The car is not being placed for loading or unloading while being moved for repair unless unloading is necessary for the safe repair of the car; and

(4) The car is properly tagged in accordance with § 232.15(b).

(c) A freight car equipped with only conventional pneumatic brakes shall not move in a freight train operating in ECP brake mode unless it would otherwise have effective and operative brakes if it were part of a conventional pneumatic brake-equipped train or could be moved from the location in defective condition under the provisions contained in, and tagged in accordance with, § 232.15.

(d) A freight train operating in ECP brake mode shall not move if less than 85 percent of the cars in the train have operative and effective brakes. However, after experiencing a penalty stop for having less than 85 percent operative and effective brakes, a freight

train operating in ECP brake mode may be moved if all of the following are met:

- (1) The train is visually inspected;
- (2) Appropriate measures are taken to ensure that the train is safely operated to the location where necessary repairs or changes to the consist can be made;
- (3) A qualified person determines that it is safe to move the train; and
- (4) The train is moved in ECP brake Switch Mode to the nearest or nearest forward location where necessary repairs or changes to the consist can be made.
- (e) A freight car or locomotive equipped with an ECP brake system that is found with inoperative or ineffective brakes for the first time during the performance of a Class I brake test or while en route may be used or hauled without civil penalty liability under this part to its destination, not to exceed 3,500 miles; provided, all applicable provisions of this section are met and the defective car or locomotive is hauled in a train operating in ECP brake mode.
- (f) A freight car equipped with an ECP brake system that is part of a train operating in ECP brake mode:
 - (1) That is found with a defective non-brake safety appliance may be used or hauled without civil penalty under this part to the nearest or nearest forward location where the necessary repairs can be performed consistent with the guidelines contained in § 232.15(f).
 - (2) That is found with an ineffective or inoperative brake shall be hauled in accordance with the following:
 - (i) § 232.15(e)(1).
 - (ii) No more than two freight cars with brakes pneumatically cut out or five freight cars or five units in a multi-unit articulated piece of equipment with brakes electronically cut out shall be consecutively placed in the same train.
 - (g) A train operating with conventional pneumatic brakes shall not operate with freight cars equipped with stand-alone ECP brake systems unless:
 - (1) The train has at least the minimum percentage of operative brakes required by paragraph (h) of this section when at an initial terminal or

paragraph (d) of this section when en route; and

(2) The stand-alone ECP brake-equipped cars are:

- (i) Moved for the purpose of delivery to a railroad receiving the equipment or to a location for placement in a train operating in ECP brake mode or being moved for repair to the nearest available location where the necessary repairs can be made in accordance with §§ 232.15(a)(7) and (f);
- (ii) Tagged in accordance with § 232.15(b); and
- (iii) Placed in the train in accordance with § 232.15(e).

(h) A train equipped and operated with conventional pneumatic brakes may depart an initial terminal with freight cars that are equipped with stand-alone ECP brake systems provided all of the following are met:

(1) The train has 100 percent effective and operative brakes on all cars equipped with conventional pneumatic brake systems;

(2) The train has at least 95 percent effective and operative brakes when including the freight cars equipped with stand-alone ECP brake systems; and

(3) The requirements contained in paragraph (g) of this section are met.

(i) *Tagging of defective equipment.* A freight car equipped with an ECP brake system that is found with ineffective or inoperative brakes will be considered electronically tagged under § 232.15(b)(1) and (b)(5) if the car is used or hauled in a train operating in ECP brake mode and the ECP brake system meets the following:

(1) The ECP brake system is able to display information in the cab of the lead locomotive regarding the location and identification of the car with defective brakes;

(2) The information is stored or downloaded and is accessible to FRA and appropriate operating and inspection personnel; and

(3) An electronic or written record of the stored or downloaded information is retained and maintained in accordance with § 232.15(b)(3).

(j) *Procedures for handling ECP brake system repairs and designation of repair locations.* (1) Each railroad operating freight cars equipped with ECP brake systems shall adopt and comply with

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specific procedures developed in accordance with the requirements related to the movement of defective equipment contained in this subpart. These procedures shall be made available to FRA upon request.

(2) Each railroad operating freight trains in ECP brake mode shall submit to FRA's Associate Administrator for Safety a list of locations on its system where ECP brake system repairs will be performed. A railroad shall notify FRA's Associate Administrator for Safety in writing 30 days prior to any change in the locations designated for such repairs. A sufficient number of locations shall be identified to ensure compliance with the requirements related to the handling of defective equipment contained in this part.

(k) *Exceptions:* All freight cars and trains that are specifically identified, operated, and handled in accordance with this section are excepted from the movement of defective equipment requirements contained in § 232.15(a)(2), (a)(5) through (a)(8), and 232.103(d) and (e).

§ 232.611 Periodic maintenance.

(a) In addition to the maintenance requirements contained in § 232.303(b) through (d), a freight car equipped with an ECP brake system shall be inspected and repaired before being released from a shop or repair track to ensure the proper and safe condition of the following:

(1) ECP brake system wiring and brackets;

(2) ECP brake system electrical connections; and

(3) Car mounted ECP brake system components.

(b) *Single car air brake test procedures.* Prior to placing a freight car equipped with an ECP brake system into revenue service, a railroad or a duly authorized representative of the railroad industry shall submit a procedure for conducting periodic single car air brake tests to FRA for its approval pursuant to § 232.17.

(c) Except as provided in § 232.303(e), a single car air brake test conducted in accordance with the procedure submitted and approved in accordance with paragraph (b) of this section shall be performed by a qualified person on a

freight car equipped with an ECP brake system whenever any of the events identified in § 232.305 occur, except for those paragraphs identified in paragraph (f) of this section.

(d) A single car air brake test conducted in accordance with the procedure submitted and approved in accordance with paragraph (b) of this section shall be performed by a qualified person on each freight car retrofitted with a newly installed ECP brake system prior to placing or using the car in revenue service.

(e) *Modification of single car test standard.* A railroad or a duly authorized representative of the railroad industry may seek modification of the single car test standard approved in accordance with paragraph (b) of this section. The request for modification will be handled and shall be submitted in accordance with the modification procedures contained in § 232.307.

(f) *Exceptions.* A freight car equipped with a stand-alone or dual mode ECP brake system is excepted from the single car air brake test procedures contained in § 232.305(a). A freight car equipped with a stand-alone ECP brake system is excepted from the single car test requirements contained in § 232.305(b)(2).

(g) For purposes of paragraphs (c) and (d) of this section, if a single car air brake test is conducted on a car prior to June 15, 2009, pursuant to the then existing AAR standards, it shall be considered the last single car air brake test for that car, if necessary.

§ 232.613 End-of-train devices.

(a) An ECP–EOT device shall, at a minimum, serve as the final node on the ECP brake circuit, provide a cable terminal circuit, and monitor, confirm, and report train, brake pipe, and train line cable continuity, cable voltage, brake pipe pressure, and the status of the ECP–EOT device battery charge. The ECP–EOT device shall transmit a status message (EOT Beacon) at least once per second, contain a means of communicating with the HEU, and be equipped with a brake pipe pressure transducer and a battery that charges from the train line cable.

(b) A railroad shall not move or use a freight train equipped with an ECP